THE GREENASIA GROUP

GREEN BUILDING COUNCIL INDONESIA

The Sustainability for the Future:

To achieve the green economy in building industry

GBCI GREENRIGHT:

Go Green & Gain for Next Generation,

A Step Ahead Style & Sustainability

May 09, 2014

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"Green economy is an economy or economic development model based on sustainable development and a knowledge of ecological economics." *United Nations Environment Programme*

"We have an economy that tells us it is cheaper to destroy earth in real time rather than renew, restore, and sustain it. You can print money to bail out a bank but you can't print life to bail out a planet." Paul Hawken Entrepreneur, Environmental Activist and Author (May 2009)

What we do

We reduce capital costs and operating costs for our clients through an integrative design process that provides triple bottom line benefits:

People

Profit

Planet

Triple bottom line

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The International Energy Agency Report

The IEA report projects that by 2035, SEA's oil imports will rise to over **5 million barrels per day**, making it the world's fourth-largest oil importer after China, India and the European Union.

The report highlighted the gains possible in South-east **Asia simply by adopting energy efficiency measures.** They would cut projected energy demand by almost **15 per cent in 2035**, an amount that exceeds Thailand's current energy demand.

Source: *Business Times*
Photo courtesy of ZeeNews

Whole systems approach

- Solving a systemic problem requires a **holistic** approach
- Systems thinking = holistic approach
- Integrative design uses systems thinking

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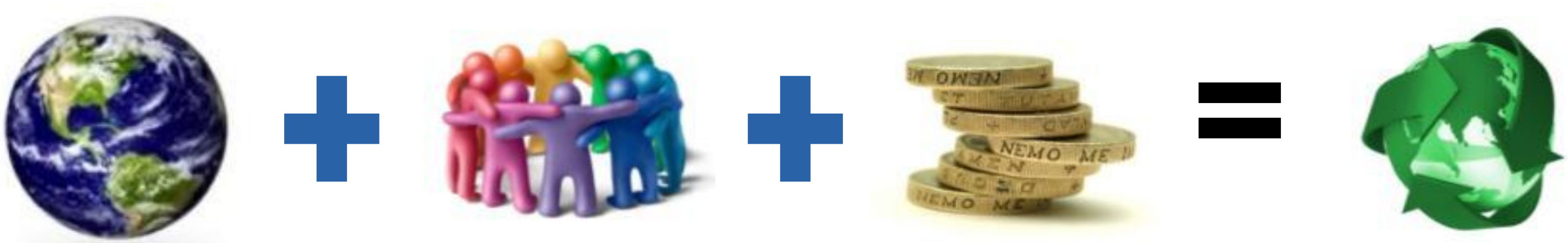
The whole systems approach to reducing capital and operating costs

- High performance design deals with a complex web of interrelated issues
- This complexity cannot be addressed through a “broad brush-stroke” or single issue approach
- Efficiency requires “designing out” technical complexity and cost by carefully rethinking, challenging and improving
- A well-defined, collaborative, integrated multi-disciplinary team process is essential



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Whole systems thinking

- The process of understanding how things influence one another within a whole
  - In nature, various elements must work together in ecosystems
  - In buildings, all the components that make up the building must work together

- Solve 'problems' by viewing them as parts of an overall system, rather than reacting to specific parts, outcomes or events
  - Piecemeal approach potentially creates unintended consequences. An improvement in one area of a system can adversely affect another.
  - Small catalytic events can cause large changes in complex systems
- Focus on cyclical rather than linear cause and effect

Measurement and management

“If you can’t measure it, you can’t manage it”

Lord Kelvin1883

“In God we trust …..all others bring data!”

Lee Eng Lock

While My Guitar Gently Weeps, Let's think better!

- Buying the best guitar in the world doesn't mean you can play like Jimi Hendrix or George Harrison
- Every string is tuned in tandem with the other to get the correct chord and sound – all systems are interlinked
- You can play with the dynamics after you get the basics right – don't create noise – create sound - test assumptions and get feedback from metrics

Courtesy Vinod Kesava

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Integrative Design Process

- An iterative process, not a linear or silo-based approach
- A flexible method, not a formula
- Different each time, not a preordained sequence of events
- Oriented to learning, innovation and improvement

What is IDP?

- IDP is the most effective process for exploring and implementing sustainable design principles on a project while staying **within budget and program schedule constraints.**
- The process is essential to achieving high performance (sustainable) buildings while avoiding or minimizing incremental costs
- Requires a multi-disciplinary and collaborative team
- Follows the design through the entire project life, from pre-design through occupancy and into operation
- Can be used for both new and existing buildings. Don't replicate the old mistakes.
- LEED/Green Mark is not the same thing as IDP

Core project team members

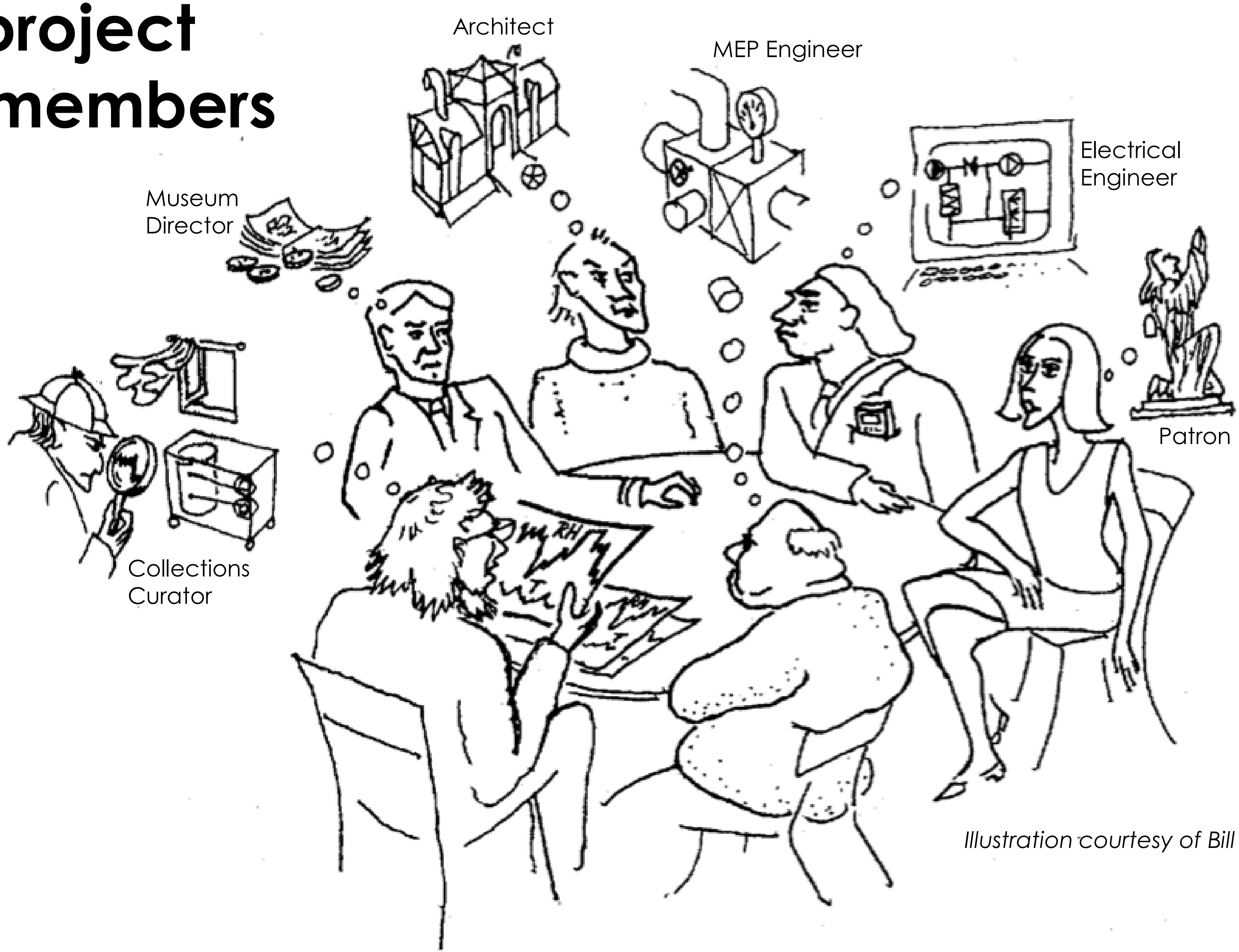
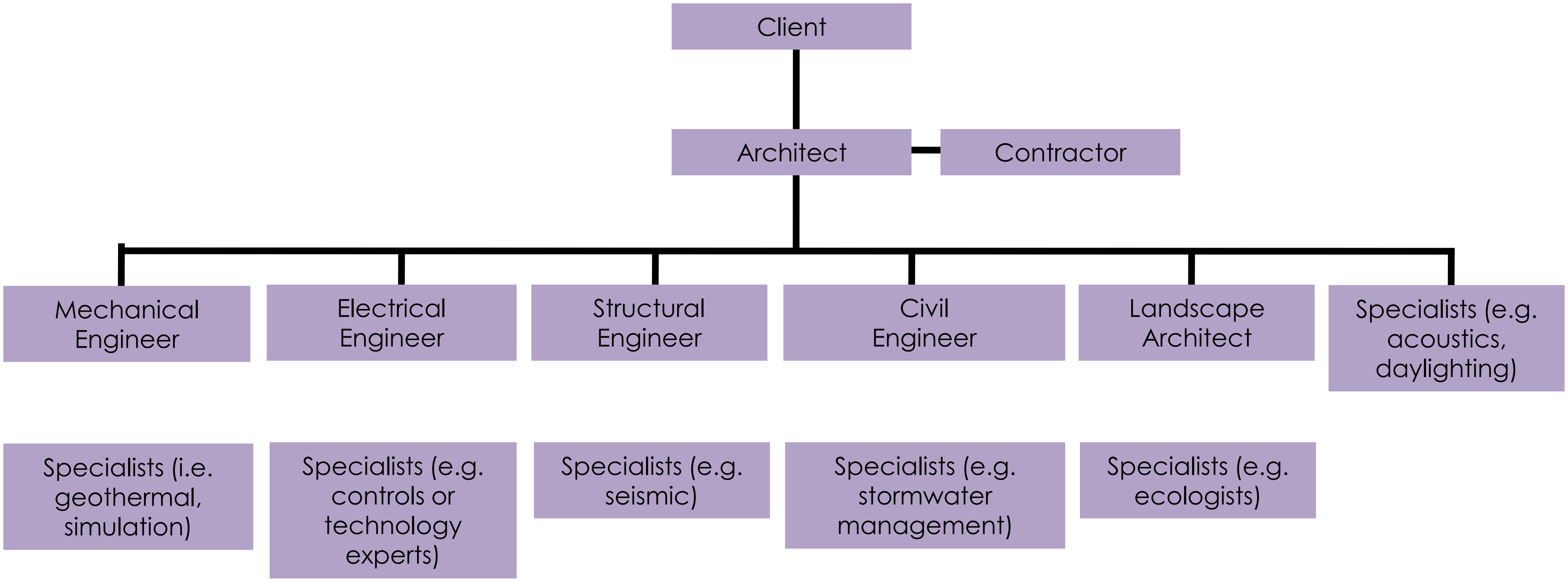
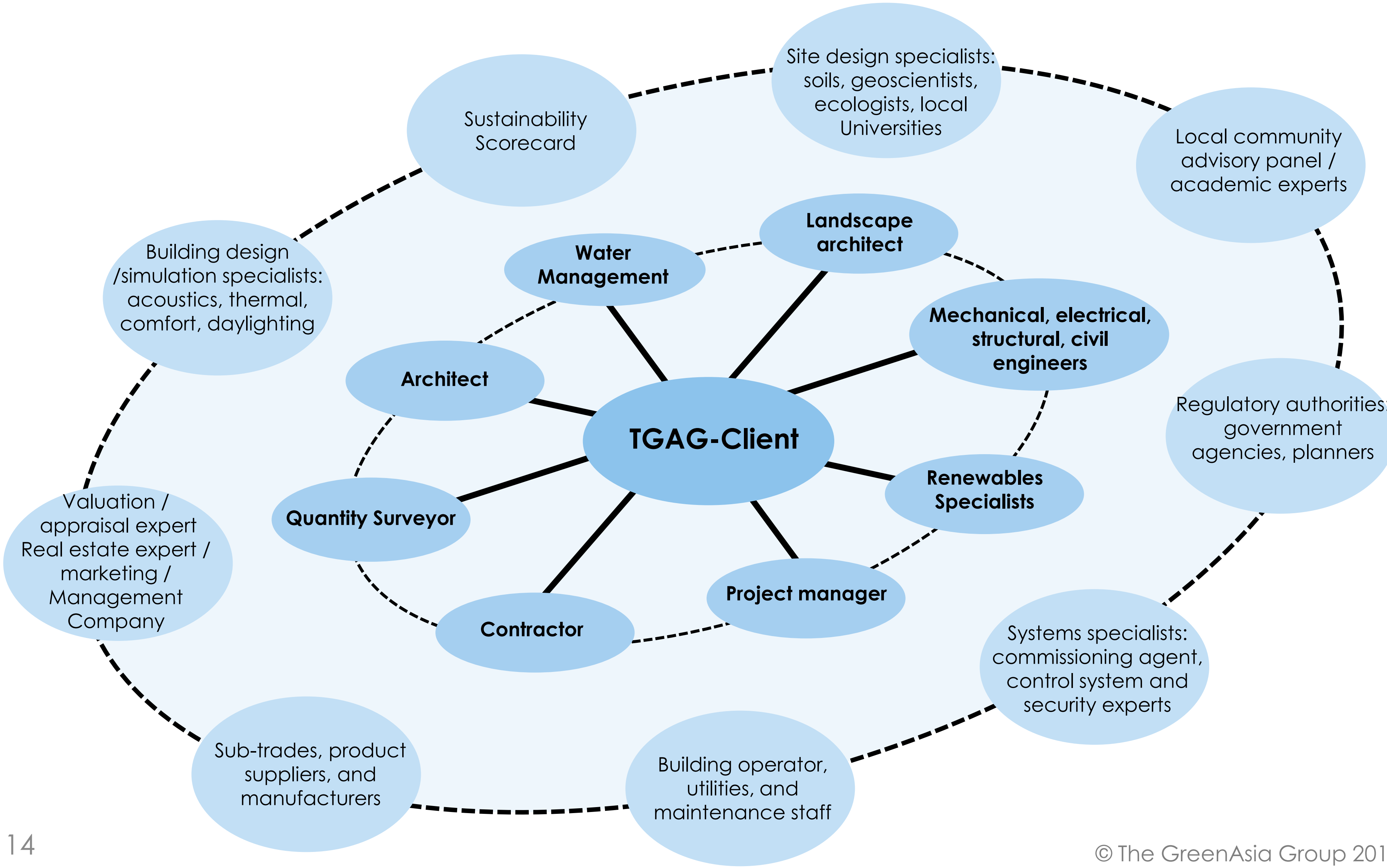


Illustration courtesy of Bill Bordass

Stakeholder Engagement:
Traditional Hierarchical Approach



Stakeholder Engagement:
TGAG Integrative Design Process Approach

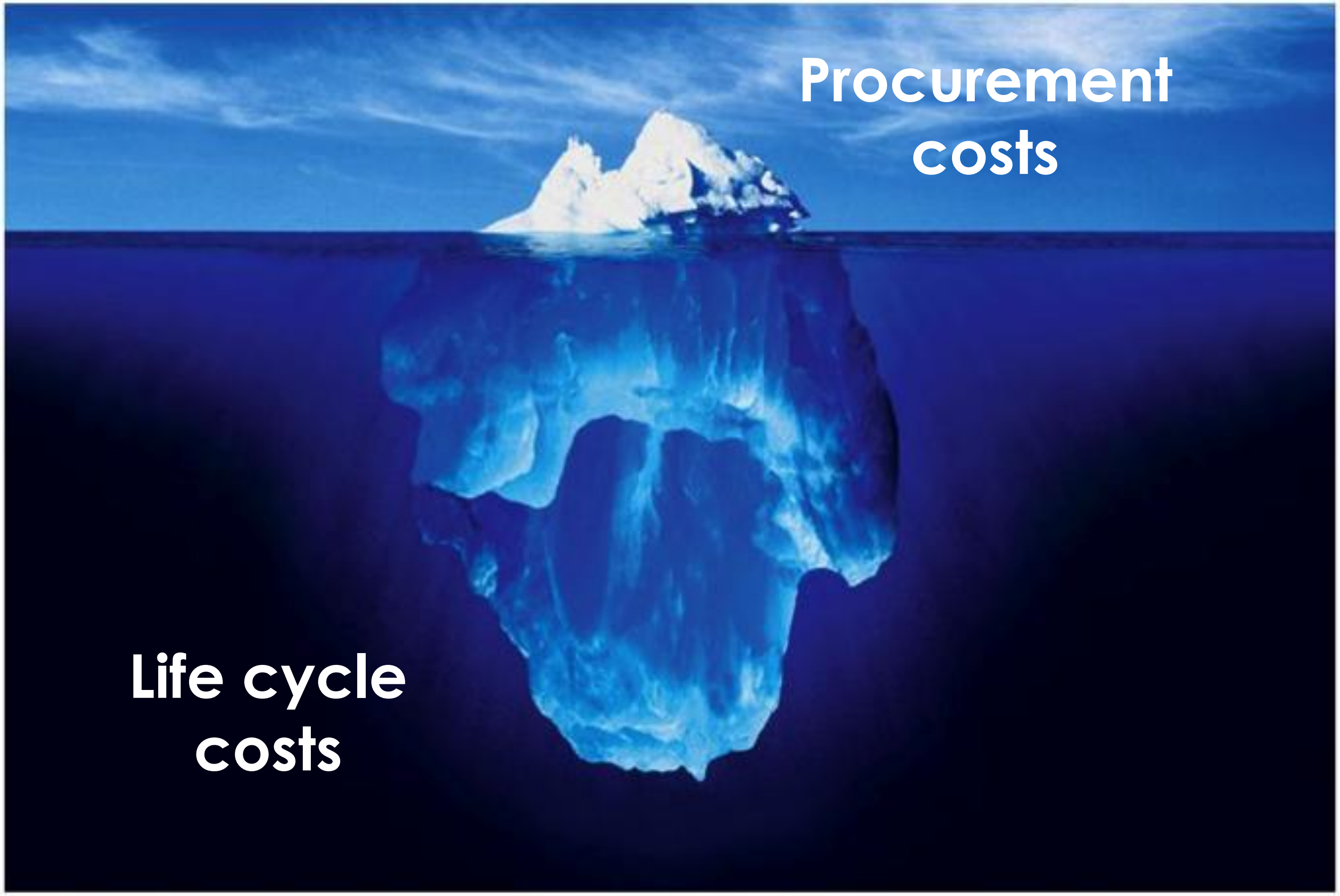


The Differences

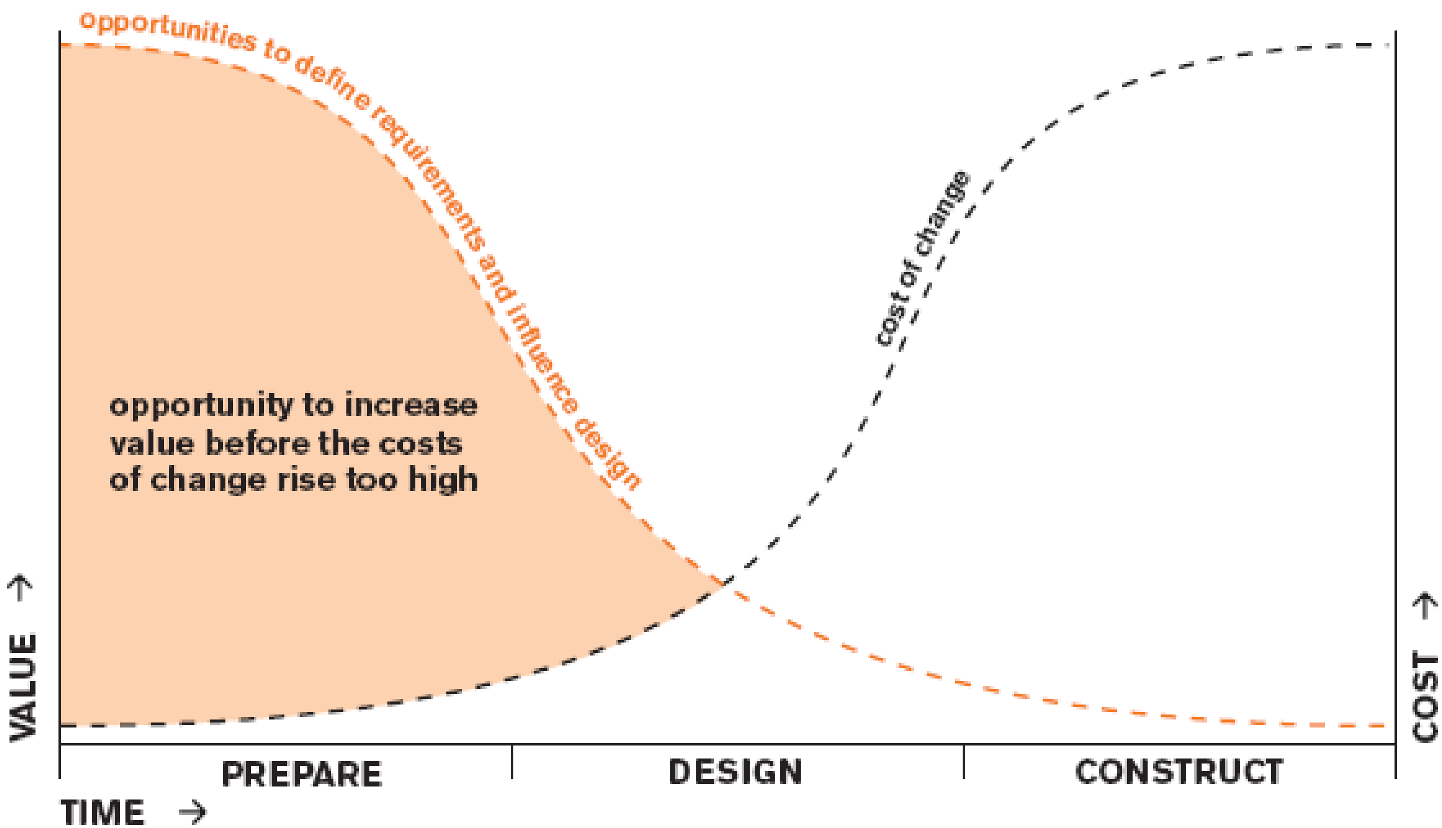
Integrative Design Process	VS	Conventional Design Process
Inclusive from the outset	vs	Involves team members only when essential
Front-loaded — time and energy invested early	vs	Less time, energy, and collaboration in early stages
Decisions influenced by broad team	vs	More decisions made by fewer people
Iterative process	vs	Linear process
Whole-systems thinking	vs	Systems often considered in isolation
Allows for full optimization	vs	Limited to constrained optimization
Seeks synergies	vs	Diminished opportunity for synergies
Life-cycle costing	vs	Emphasis on up-front costs
Process continues through post-occupancy	vs	Typically finished when construction is complete

Source: *Roadmap for the Integrated Design Process*

Make decisions based on lifecycle costs, not just first costs

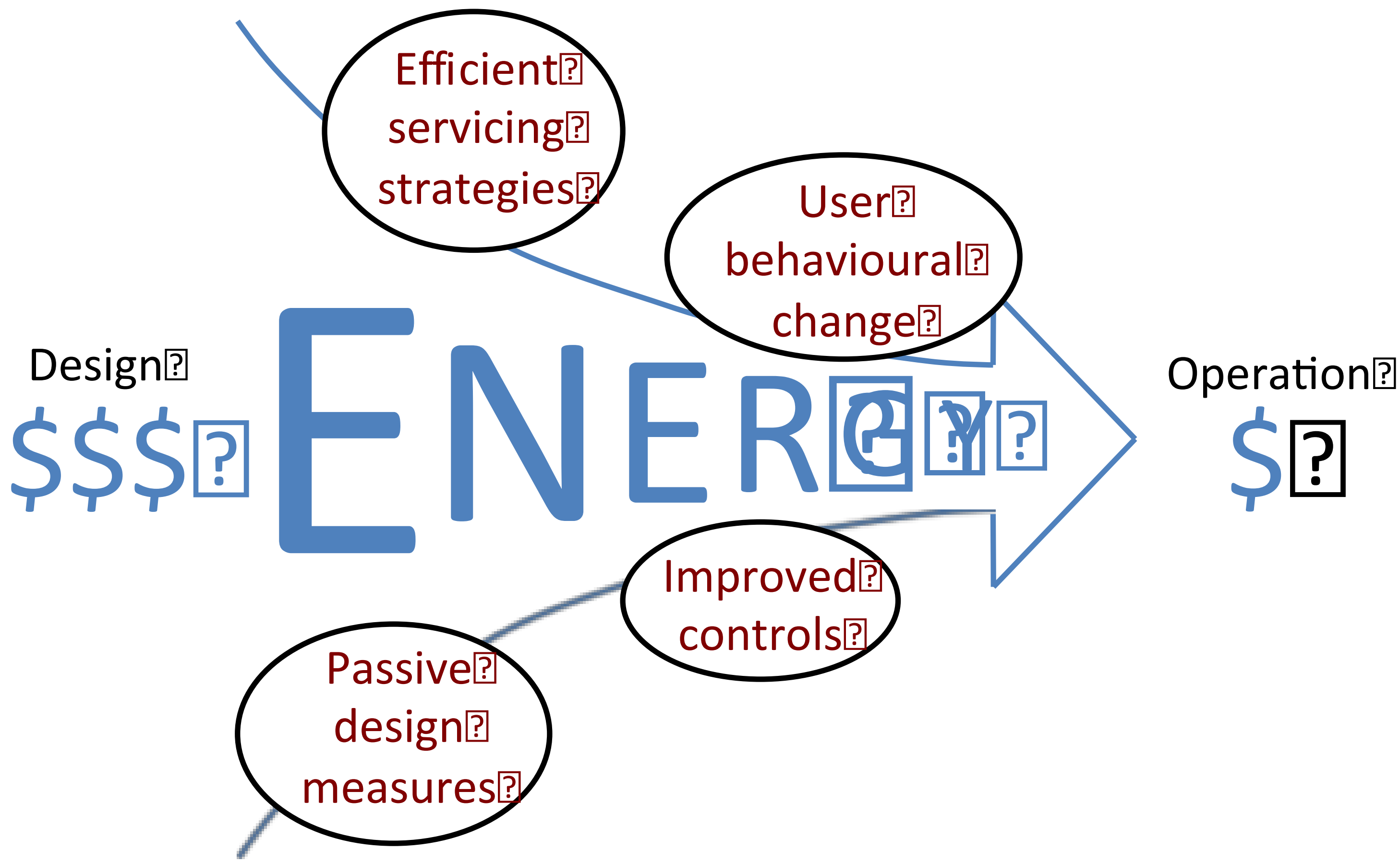


Integrative Design Opportunities



Opportunities to engage integrative design

Reducing energy consumption from operations



LEED/Green Mark
is not the same thing as
an Integrative Design Process

Often the team's only purpose is to achieve LEED points

- The architecture is designed separately, without the engineer's input concerning its energy performance
- **Energy modeling is done only to get the point, rather than to inform design decisions**
- Commissioning is often an afterthought
- Etc.

What are the benefits?

- ✓ **Reduced utility costs** – energy and water usage reduced through the implementation of IDP
- ✓ **Reduced waste streams** – waste reduced and recycled, used to create energy
- ✓ **Working conditions** – cleaner, safer and more efficient work spaces
- ✓ **Improved Staff retention** – through training and teambuilding
- ✓ **Enhanced image** – commitment to environmental stewardship generates positive publicity for an organisation
- ✓ **Lessens Liability** – through improved workplace safety practices
- ✓ **Setting an example** – developing systems in environmental awareness and responsibility for staff and local communities to follow

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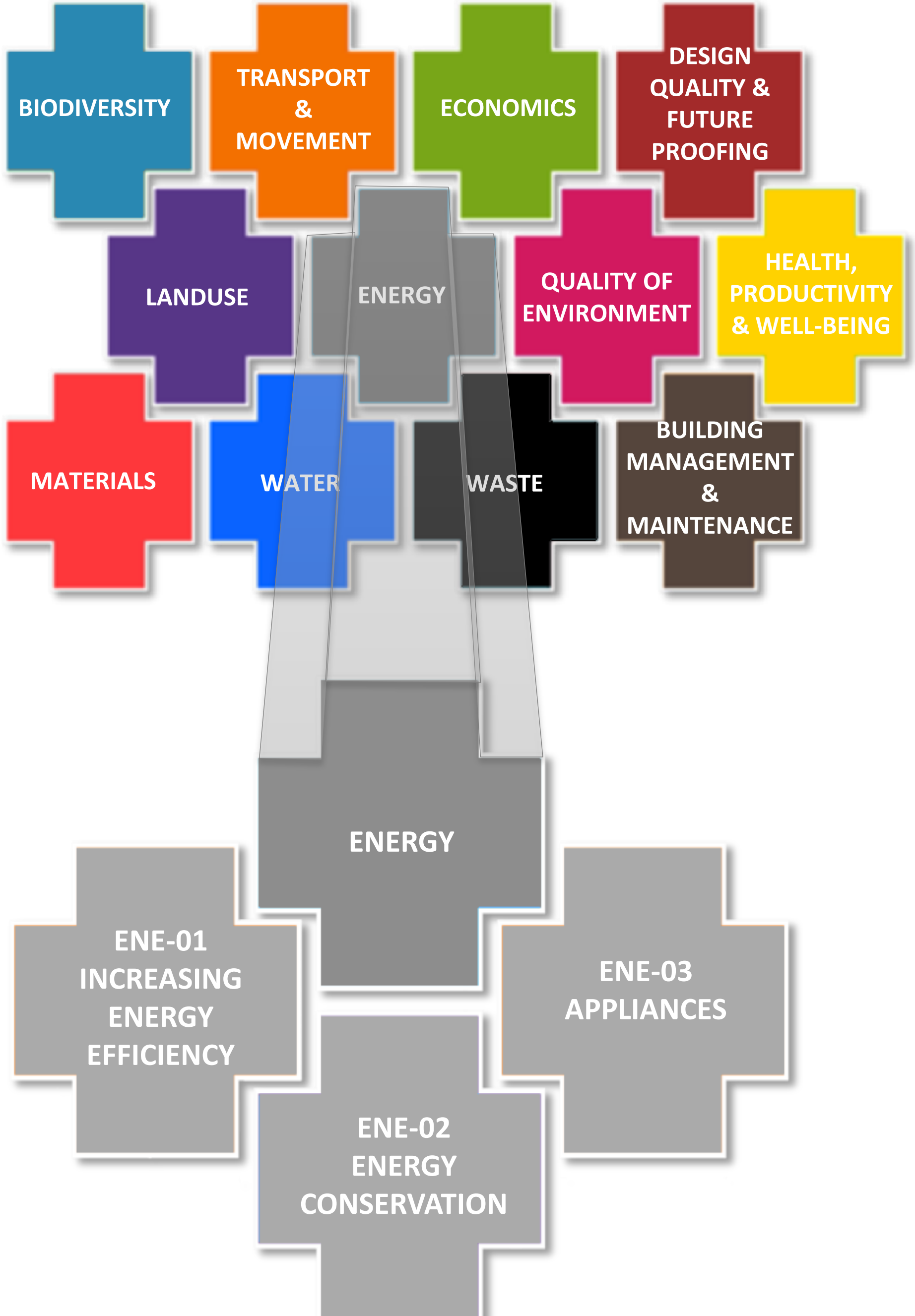
Our Approach to Sustainable Development
The 12 Pillars of Sustainability

The 12 Pillars



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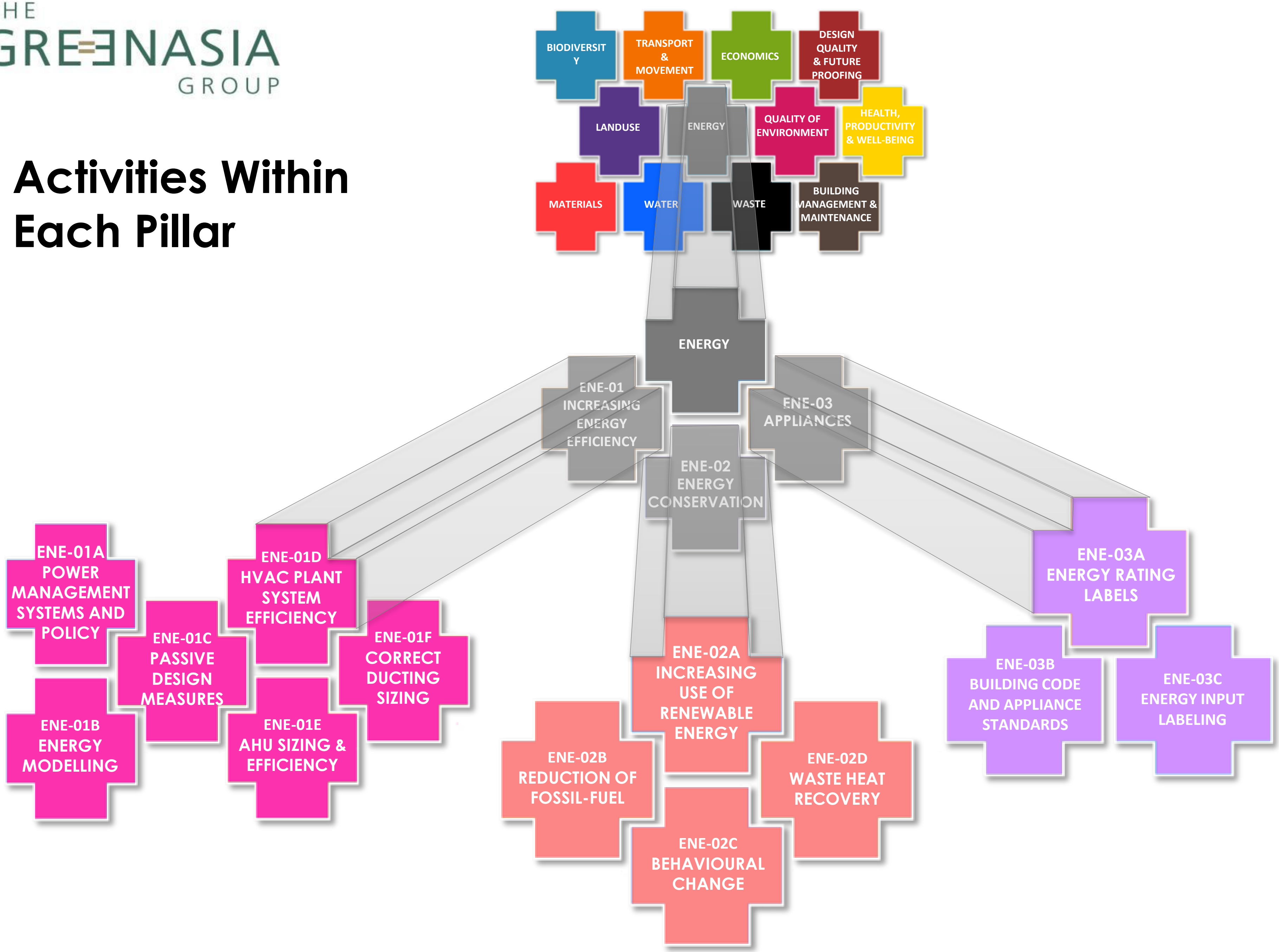
Activities Within Each Pillar



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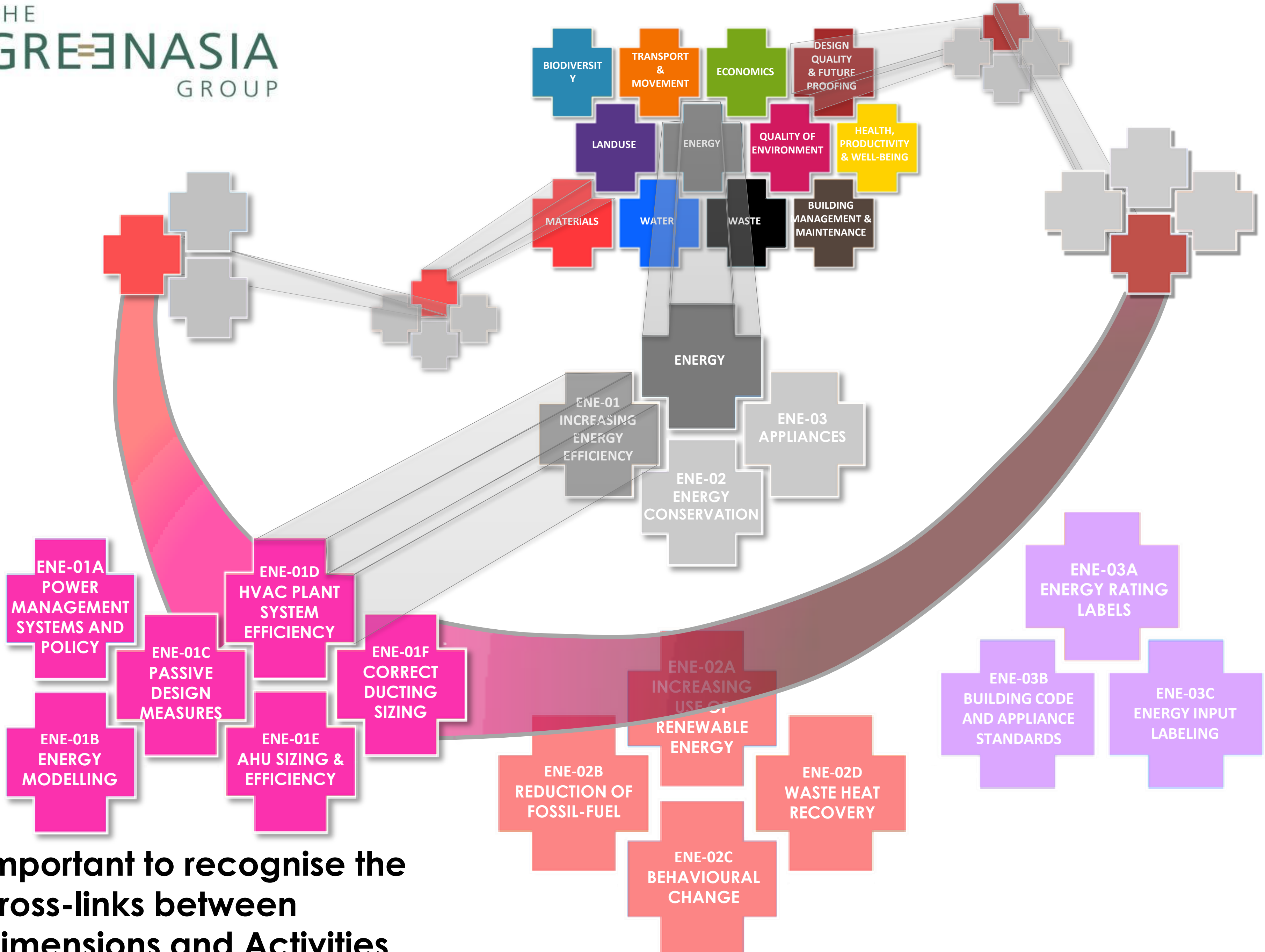

Important to recognise the cross-links between Dimensions and Activities

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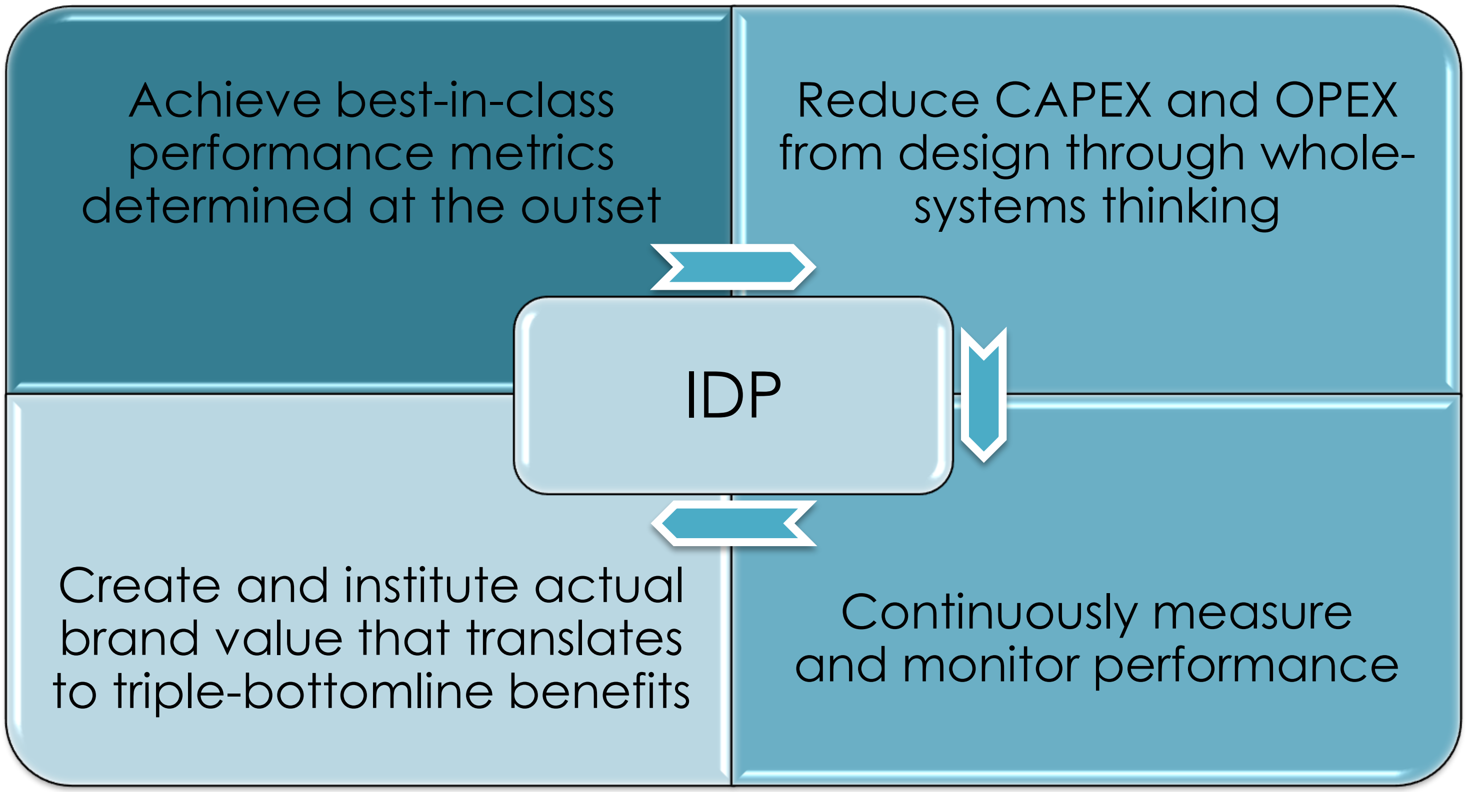
Objectives to be achieved through IDP



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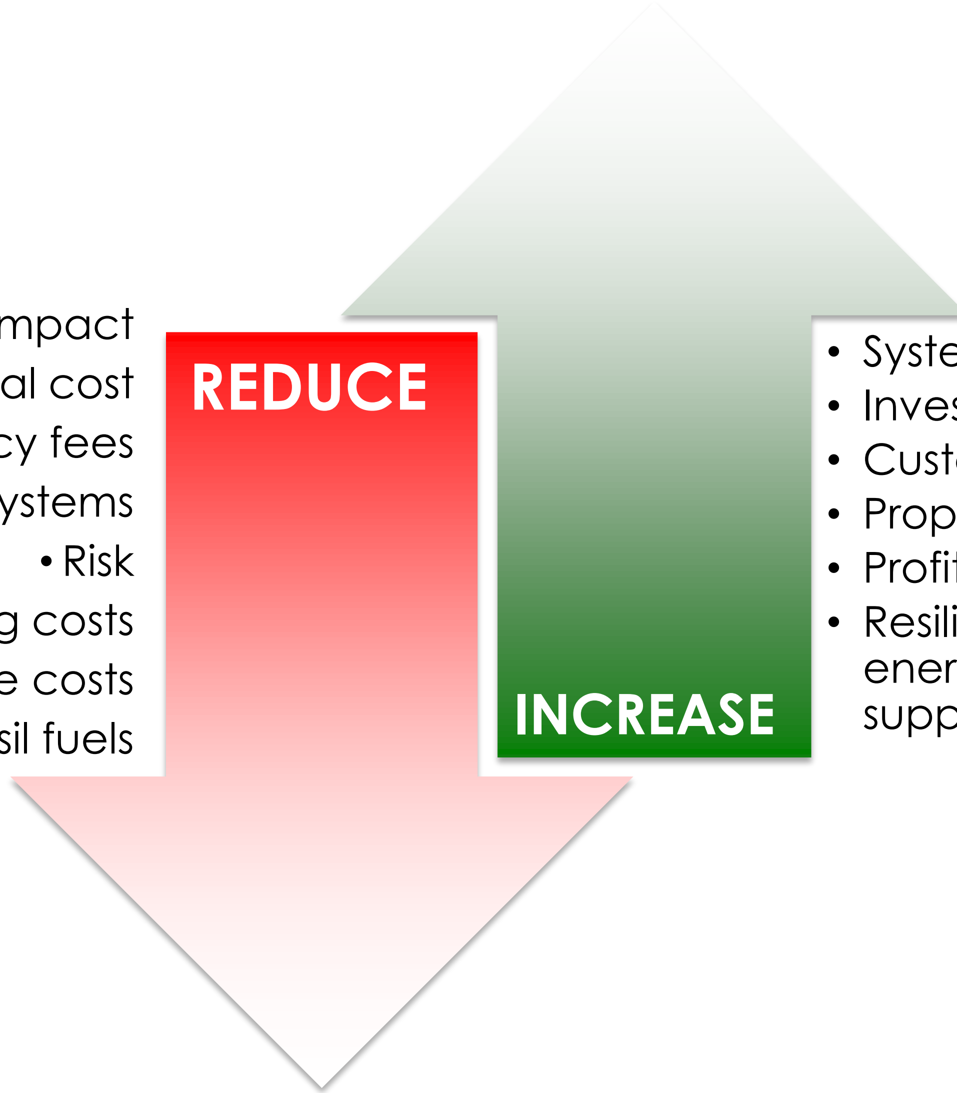
The Business Case

- Environmental impact
- Capital cost
- Consultancy fees
- Oversized servicing systems
- Risk
- Operating costs
- Maintenance costs
- Reliance on fossil fuels



- Systems integration
- Investor value
- Customer interest
- Property value
- Profit margins
- Resilience against future energy & water price & supply volatility

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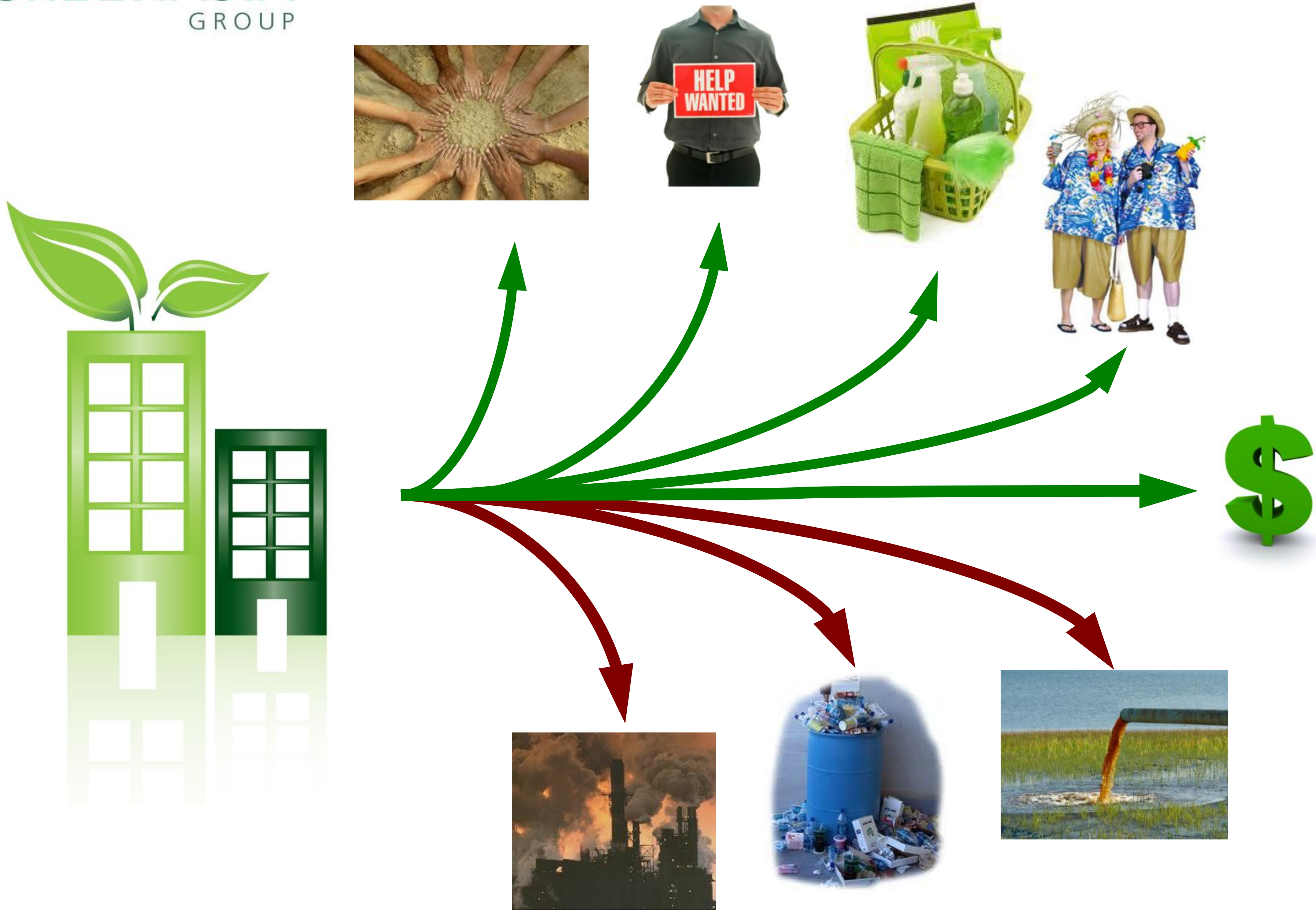

Island development

How do these developments, and their lack of sustainability fit into the landscape?

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Area of concern

- ✓ Water management – there must be harvesting of all rain and stormwater, grey water must be used, there must be a good understanding of total water, soil, and the areas that can be landscaped - water must be returned to the water table.
- ✓ This is a holistic water management design knowing how the whole site receives, uses and stores water
- ✓ Energy management – look at microhydro, biomass, using a vortex (water is reenergised and purified, viruses taken out)
- ✓ Feature solar for the landscape features – and charge the batteries for back up to generator.
- ✓ Social aspects must involve local community and utilise local materials
- ✓ Waste management – reduce, reuse, make the most of the waste and convert it for use

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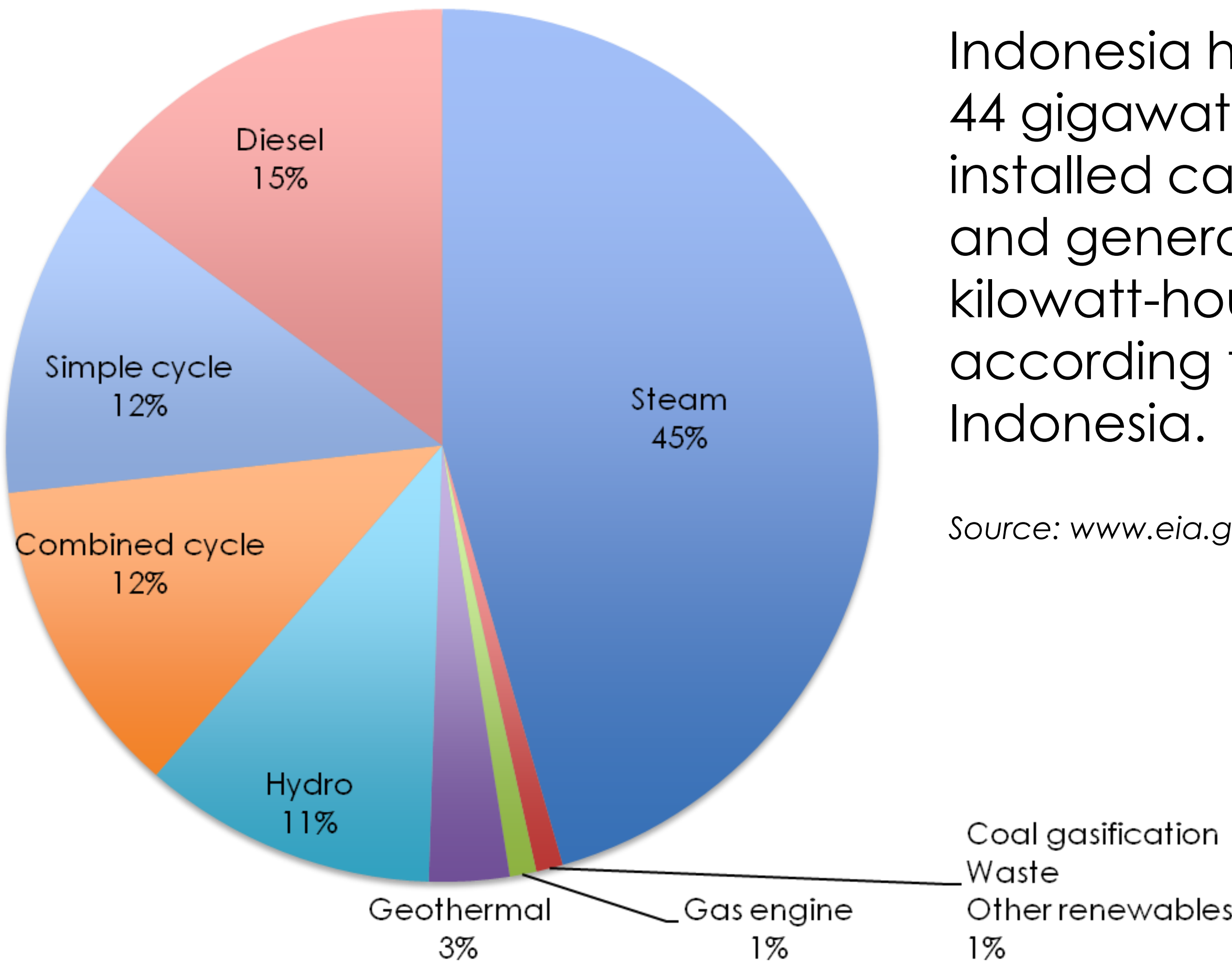
Indonesia energy generation 2011



Indonesia had an estimated 44 gigawatts (GW) of installed capacity in 2011 and generated 192 billion kilowatt-hours (kWh), according to BPS-Statistics Indonesia.

Source: www.eia.gov

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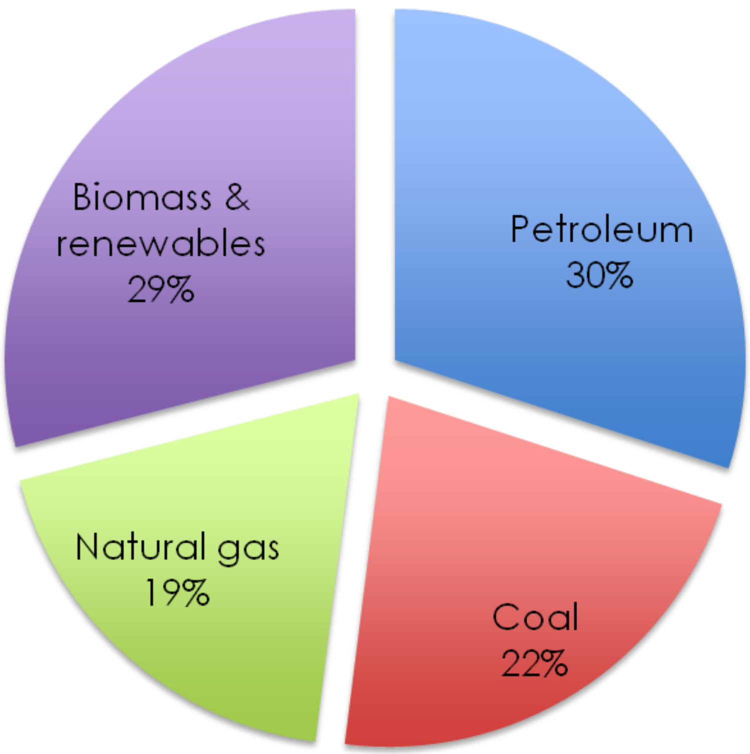
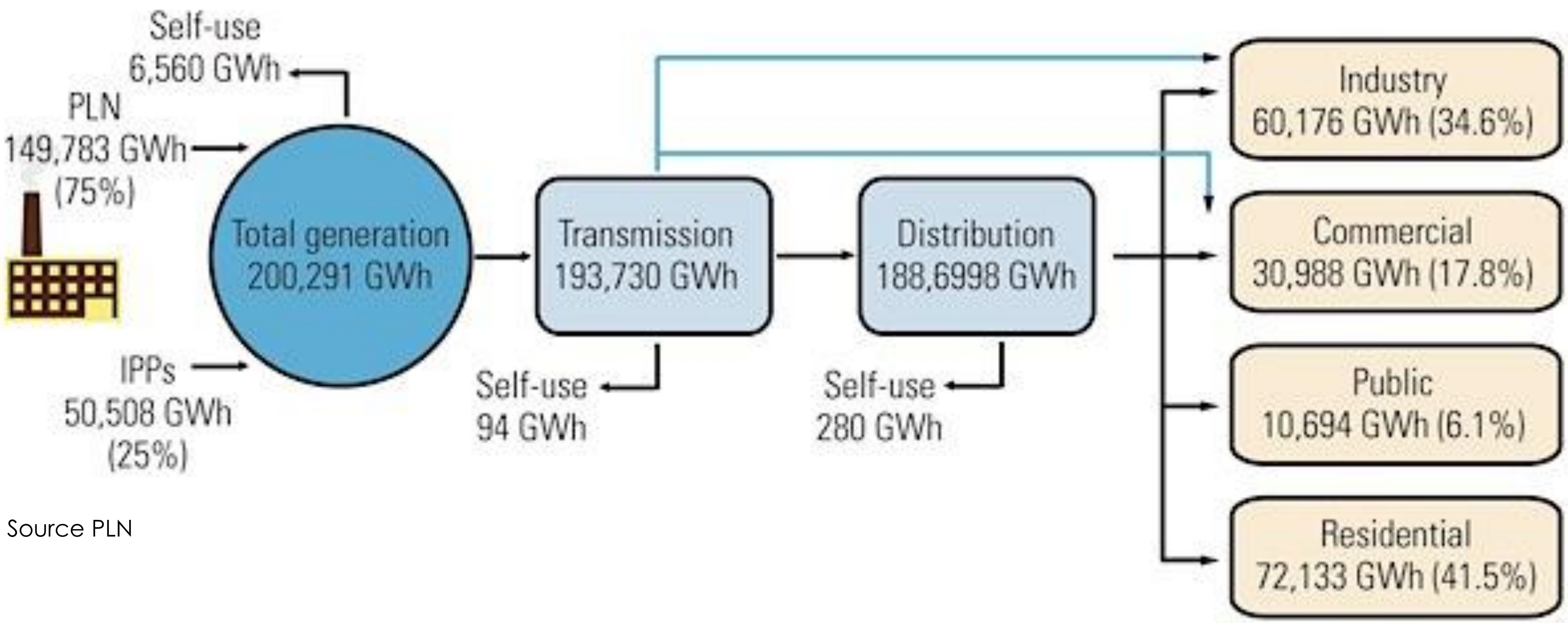
Indonesia primary energy consumption 2011



Source US Energy Information Administrative, International Energy Statistics

- Indonesia's total primary energy consumption grew by over 50 percent between 2001 and 2010.
- Indonesia still relies on oil to meet 44 percent of its energy needs, while gas accounts for 23 percent, coal 27 percent and renewable energy 6 percent.
- In 2011, CO_2 emissions from consumption of energy: 402.1 million Mt

Indonesia power consumption 2012



Source PLN

One reason for increased domestic gas consumption, which accounted for 42% of total production in 2011, is the country's declining oil production and reliance on natural gas for transportation.

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Indonesia electricity

Generation capacity growth in Indonesia has lagged behind the pace of electricity demand growth, leading to power shortages and a low electrification ratio.

- The Indonesian government has set a goal of 90 percent national electricity coverage in households by 2020.
- Domestic demand for electricity as a whole is increasing in line with the country's macro economic growth at approximately 9% per annum which is expected to continue up to 2019.
- In reverse, the growth in electricity generation capacity is failing to keep pace with the rate of demand at less than 5% growth annually.

Indonesia electricity

"Complicating Indonesia's challenges is a government commitment to electrify 99% of the country by 2020—up from about 76% in 2012. Subsidizing energy "caused Indonesian behavior trends to be consumptive and wasteful on energy use".
Rudi Rubiandini, Vice Minister of Energy and Mineral Resources (EMR)

Tariffs have been set low by the government for social reasons, but the cost of generation is much higher than the average tariff!

Renewable energy

- The contribution of renewable sources of energy to energy supply as a percentage of total primary energy supply in 2010 was 34.5%.
- Renewable generation sources supplied 16% of Indonesia's electricity in 2011.
- Indonesia has set a target of 26% of electricity generation from renewable sources by 2025

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Renewable energy

Biomass

- Biomass resources have an estimated production potential of 49,810 MW, but fewer than 1,000 MW have been developed to date.
- An estimated 55% of Indonesia's population, i.e. 128 million people primarily rely upon traditional biomass for cooking.

Hydroelectricity

- Indonesia has set a target of 2 GW installed capacity in hydroelectricity, including 0.43 GW micro hydro, by 2025.

Geothermal

- The government has outlined goals to install 9.5 GW of geothermal capacity by 2025, so that the resource will account for about 6% of the country's energy consumption.

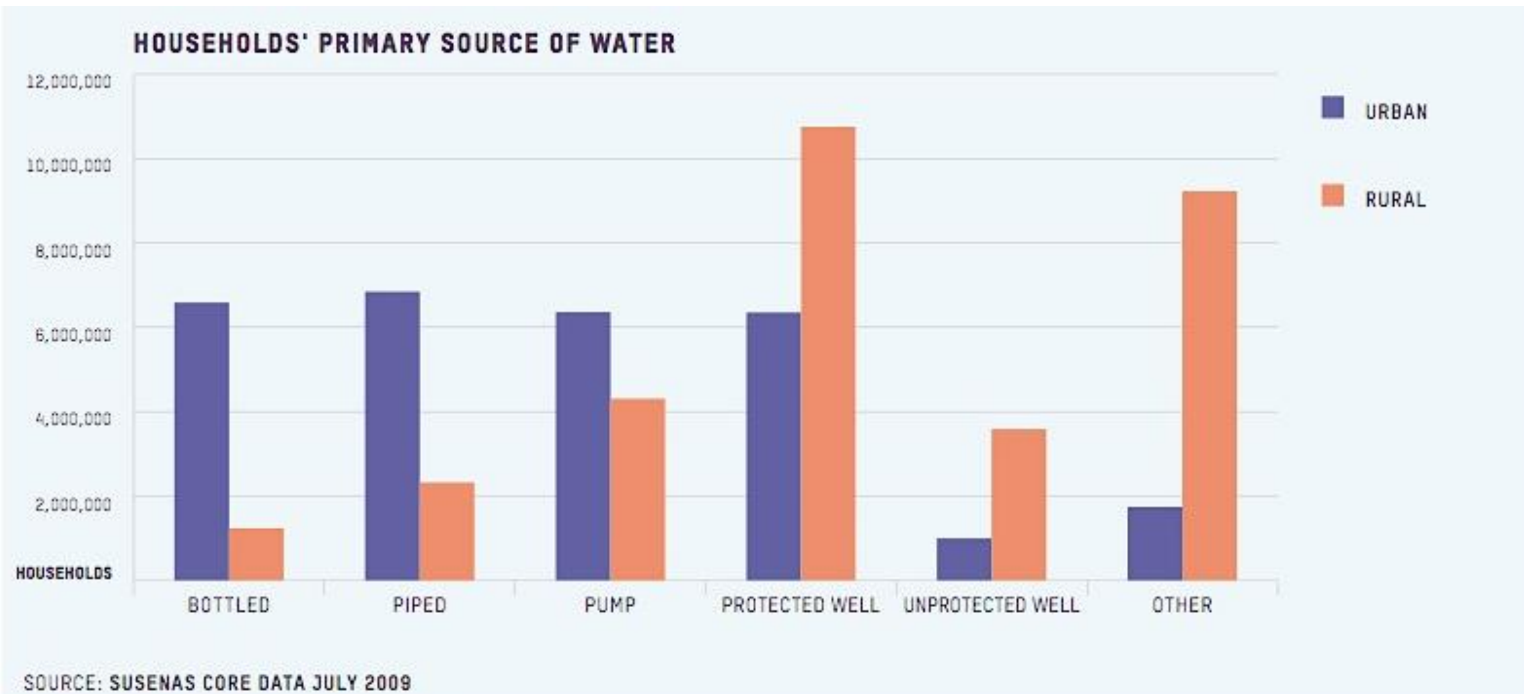
Grid

- Consisting of eight domestic interconnected systems and 600 isolated grids—all operated by PLN—Indonesia's power grid is characterized by high transmission losses and electricity theft.

Water resource

Surface water **1,973 km³/yr** and Groundwater **457,4 km³/yr**

Total renewable water resources **2,019 km³/yr**



Households' primary source of drinking water in urban and rural areas

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Water withdrawal

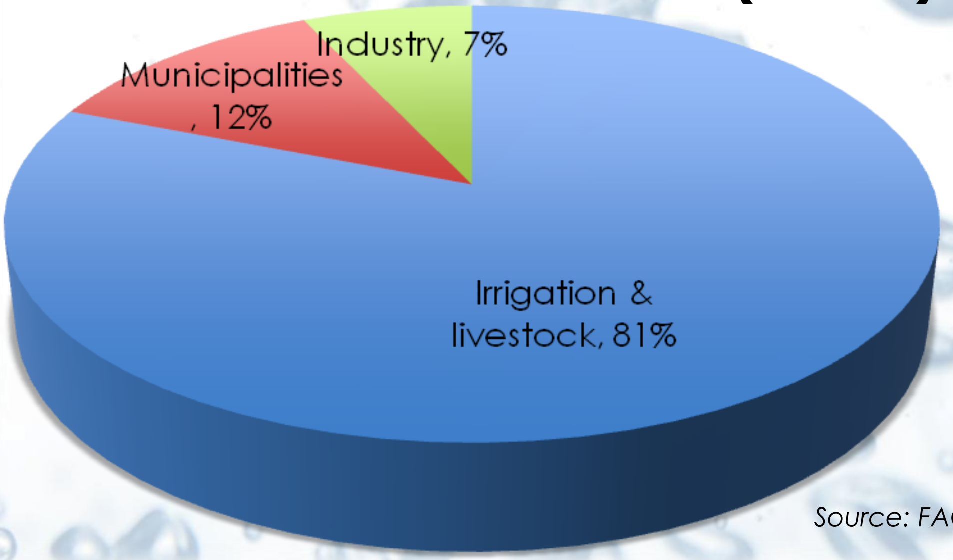
Total freshwater withdrawal (domestic/industrial/agricultural)

113.3 cu km³/yr

81% (93 km³) for agriculture

12% (13 km³) for municipalities

7% (7 km³) for industries



Source: FAO

Groundwater is used by 74 percent of households for their clean water sources, while the rest use river water (3.4 percent), piped surface water (21.2 percent), and other water sources (1.4 percent).

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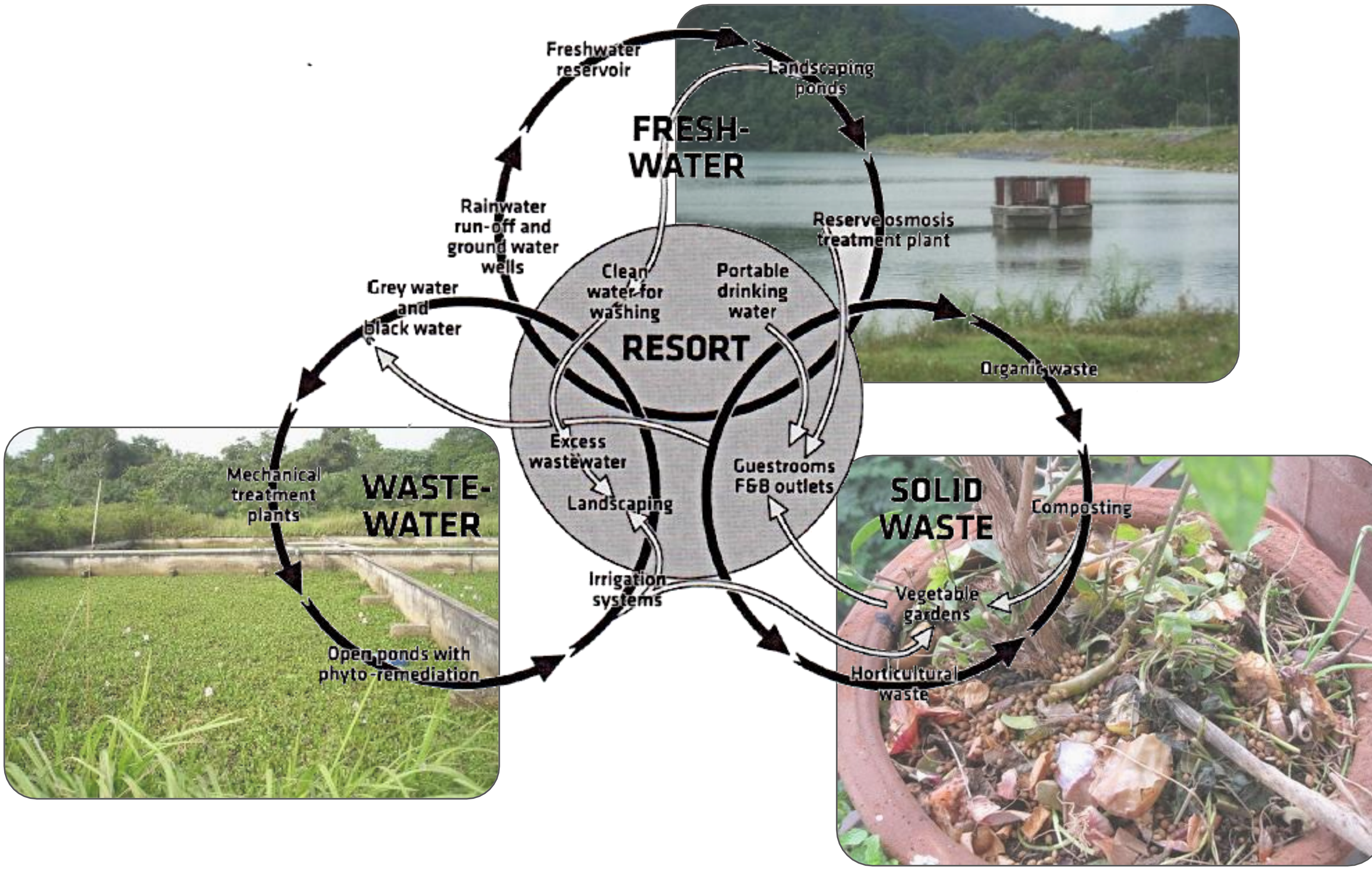
Water harvesting & recycling in a resort



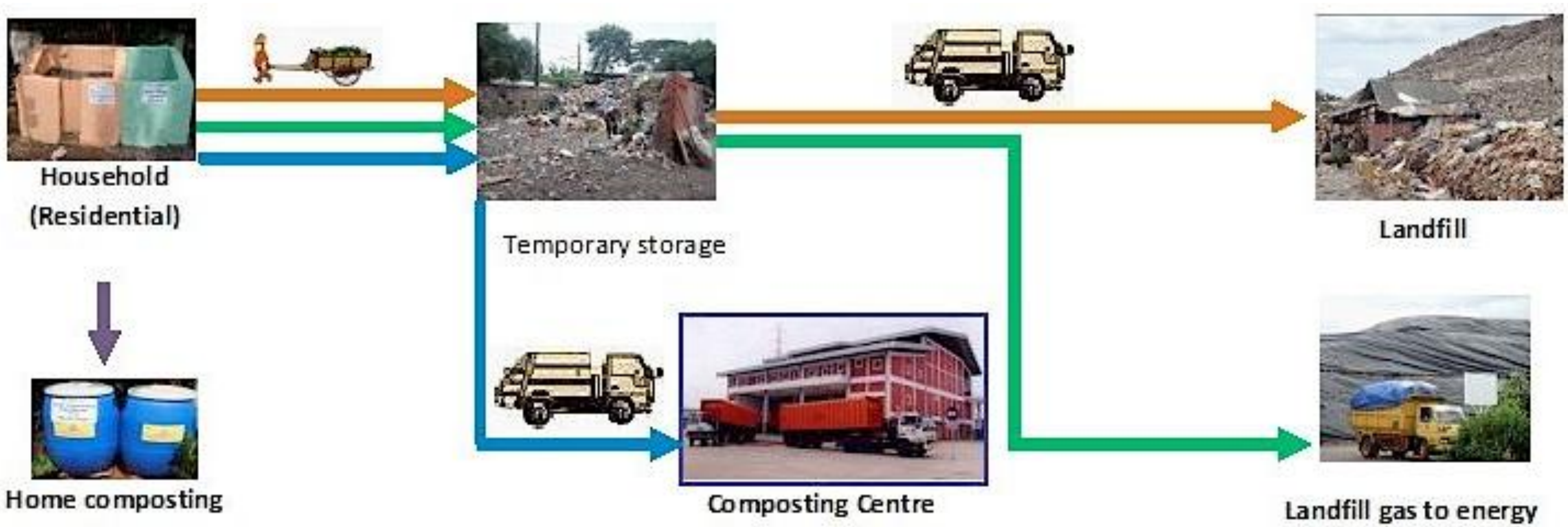
Water – for reflection

- Decreasing clean water resources – tests show **polluted seawater** because of ineffective waste management by hospitality and tourist-related businesses
- By 2015, Bali will suffer from **unproductive rice paddies** on the southern coast, the effects of a clean-water deficit, thus prompting their conversion to residential areas
- Sea abrasion has destroyed much of the island's 470 kilometer-long coastal areas, unbridled development has **lowered the water table** and led to seawater intrusion 5km inland to a depth of 70m
- In 2012, for Denpasar itself, water shortfall in production is105 liters per second. Demand for fresh water was an average of 1,375 liters of water per second whilst production capacities stood at only 1,269 liters per second.

Source: BisnisBali 2009

Waste

- The urban population is expected to increase by 65% by 2030 compared to its level in 2006 (ADB, 2006).
- Major urban centres in Indonesia produce nearly 10 million tonnes of waste annually, and this amount increases by 2 to 4% annually (Ministry of Environment, 2008)
- Jakarta uses a major landfill located at BantarGebang in the suburban town of Bekasi, and the landfill only absorbs approximately 6,000 tonnes per day



Flow chart of the household solid waste management system in Jakarta

Waste generation in Indonesia

Area	Waste generation (million ton/year)
Sumatera	8.7
Java	21.2
Balinusra	1.3
Kalimantan	2.3
Sumapapua	5.0
TOTAL	**38.5**

Source: Indonesian domestic Solid Waste Statistic, p.5, MoE, 2008

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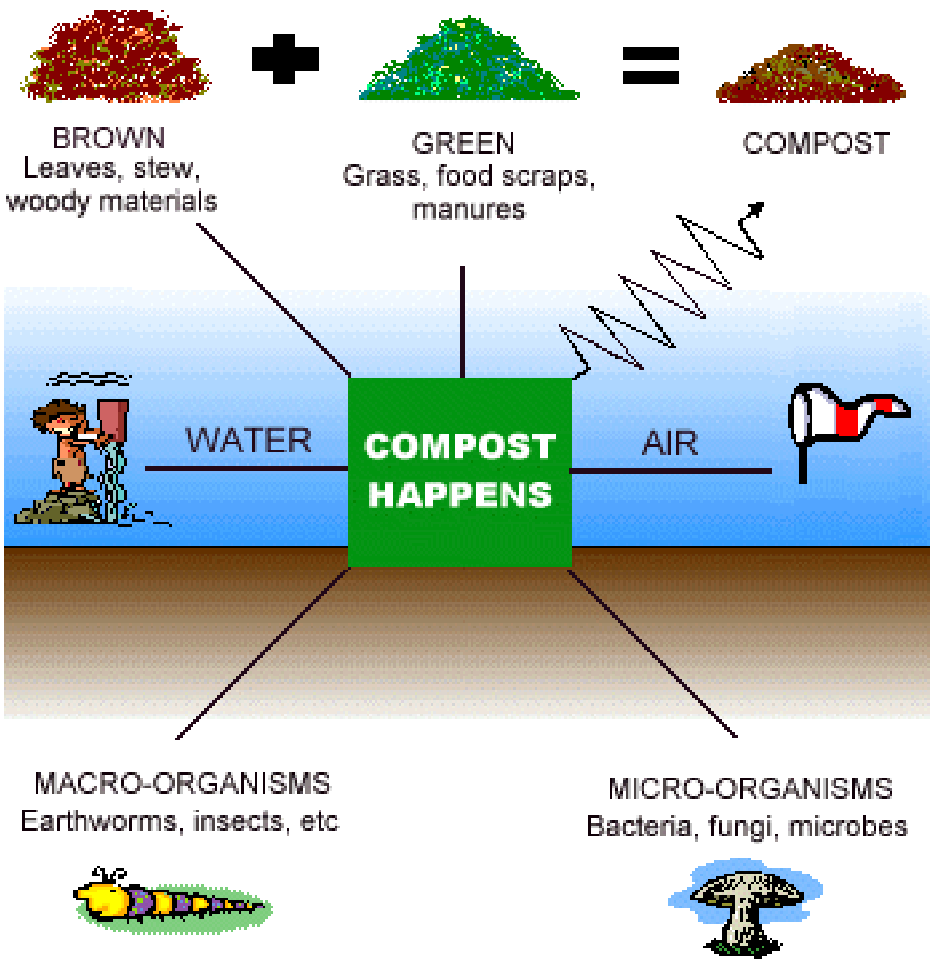
Waste management

- 75% of the 20,000m³ of garbage generated every day is left **uncollected**, with about 15,000m³ of trash disposed of along roadsides and at illegal dumps

- According to the State Ministry of Environment (MoE), every Indonesian generates 0.76 kg/day of MSW
- The average tourist produces 5kg/ day

Jakarta Post December 14, 2010 – Extreme weather causes floods, landslides in Bali
"Rivers here are already troubled because of people's bad habits of dumping their household garbage."

Waste composting



There are usually 10 neighbourhood units (*RukunTetangga*) within 1 neighbourhood cluster (*RukunWarga*) in which approximately 680 households reside and are involved in the communal composting initiative .
(Waste Management Task Force, 2008)

Natural / organic fertilizer and biodiesel from community waste

Safe organic fertilizers

- Agricultural waste, newspapers, wood chips, rotten fruit and vegetable scraps and straw-based animal manure: composting daily waste to moisturise and add the nutrients to the soils:
- House-to-house solid waste: the waste is composted into enriched bio-fertilizers. Land is provided for community composting and the organic wastes are separated from other rubbish. This composting program can reduce tonnes of CO_2 emissions each year, generate new jobs for the local community and also reduce more than half of the generated solid waste.

Biodiesel: organic, non-toxic and biodegradable fuel made from everyday renewable resources, such as used cooking oil and animal fats.

Benefits:

- Local employment
- Individual biogas units to power houses, community centre (banjar / temples), small community shops

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Natural / organic fertilizer from waste

Safe organic fertilizers

- Eggshells: with its 93% calcium carbonate, the same ingredient as lime, a trusted soil amendment, eggshells are essential for healthy cell growth in all plants and especially important for fast growing ones which quickly deplete calcium from the soil.
- Leaves and grass clippings: Dried leaves aerate heavy clay soils, and improve the water holding capacity of sandy soils. Grass clippings when soaked in water produce a nitrogen rich fertilizer that can be applied to the soil.
- Coffee grounds or tea leaves: The high content of nitrogen in coffee grounds and tea leaves is good mulch for fast-growing vegetables and plants.
- Banana peels: by simply throwing them around the soil beds and covering with mulch, banana peels will add potassium to the soil.

Source: *Bali Advertiser - Natural Fertilizers From Common Ingredients*

The largest and simplest opportunity to reduce our adverse impact on the environment is through accurate energy efficient design. This combined with collaborative solutions from whole-systems integrative design is crucial in making a positive difference.

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The GreenAsia Group 2013

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